Balanced Scorecard
Spring 2008
P. Lot 1 J. Hill

Internal Business Process	
Objective:	Maintain Station Heat Rate
Initiative:	Investigate Generator Hydrogen Purity to Obtain Greater Efficiency

The high thermal conductivity and low density of hydrogen make it an excellent fluid for cooling electric power generators. Hydrogen is one-fourteenth the density of air for a given pressure and density and the use of hydrogen reduces the windage losses within a generator to a small fraction of the losses encountered when the generator is air cooled. Windage losses account for 30 to 40 percent of generator losses in hydrogen cooled generators and it is caused by friction between the gas and rotor. This loss increases as the purity of the gas decreases. At IGS, the purity of the gas is currently maintained by feeding hydrogen into the generator from trailer-mounted cylinders which can maintain the purity levels at 96 to 98 percent. Producing on-site hydrogen generation has the potential to increase the purity of hydrogen in the generator to over 99 percent which would reduce windage losses and improve overall plant efficiency.

Producing hydrogen on-site would also reduce the cost of hydrogen supply. We looked at the economic benefits of purchasing this equipment based on reducing the cost of hydrogen supply alone as part of a previous balanced score card item just a few months ago. That analysis showed that it was not justified. We were unaware at that time that on-site generation equipment produced higher purity hydrogen which improves generator efficiency.

Installing on-site hydrogen generation would cost around $250,000 but has the potential to reduce coal consumption by 7500 tons annually or about 0.15 percent of the total coal consumed. The fuel savings combined with the savings in hydrogen purchases and trailer rental will result in a one-year payback and 111 percent rate-of-return.

We recommend that this be placed on the next capital budget for implementation.